



Cambridge IGCSE™

CANDIDATE
NAME

--

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--



CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/42

Paper 4 (Extended)

May/June 2023

2 hours 15 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π , use your calculator value.

INFORMATION

- The total mark for this paper is 120.
- The number of marks for each question or part question is shown in brackets [].

This document has **20** pages. Any blank pages are indicated.

Formula List

For the equation $ax^2 + bx + c = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A , of cylinder of radius r , height h . $A = 2\pi rh$

Curved surface area, A , of cone of radius r , sloping edge l . $A = \pi rl$

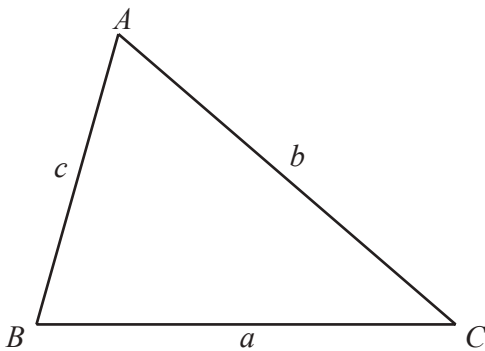
Curved surface area, A , of sphere of radius r . $A = 4\pi r^2$

Volume, V , of pyramid, base area A , height h . $V = \frac{1}{3}Ah$

Volume, V , of cylinder of radius r , height h . $V = \pi r^2 h$

Volume, V , of cone of radius r , height h . $V = \frac{1}{3}\pi r^2 h$

Volume, V , of sphere of radius r . $V = \frac{4}{3}\pi r^3$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area} = \frac{1}{2}bc \sin A$$

Answer **all** the questions.

1 For each of these sequences, find the next term and an expression for the n th term.

(a) 17 14 11 8 5 ...

next term

n th term [3]

(b) $\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{4}{5}$ $\frac{5}{6}$...

next term

n th term [2]

(c) 4 8 16 32 64 ...

next term

n th term [3]

(d) -2 5 24 61 122 ...

next term

n th term [3]

- 2 The population of a species of bird is estimated to be decreasing by 4% per year. At the end of 2020 the population was 4.32 million.

(a) Find the population at the end of 2019.

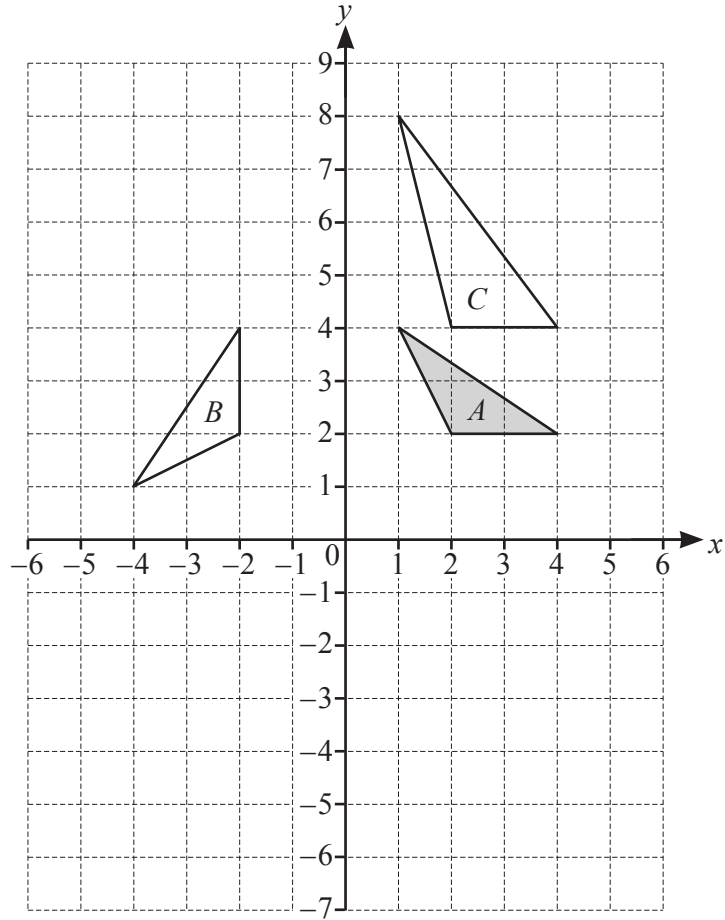
..... million [2]

(b) Calculate an estimate for the population at the end of 2025.

..... million [2]

(c) Find the year in which the population is first expected to be below 2 million.

..... [4]



(a) Reflect triangle *A* in the line $y = -1$. [2]

(b) Translate triangle *A* by the vector $\begin{pmatrix} -5 \\ 3 \end{pmatrix}$. [2]

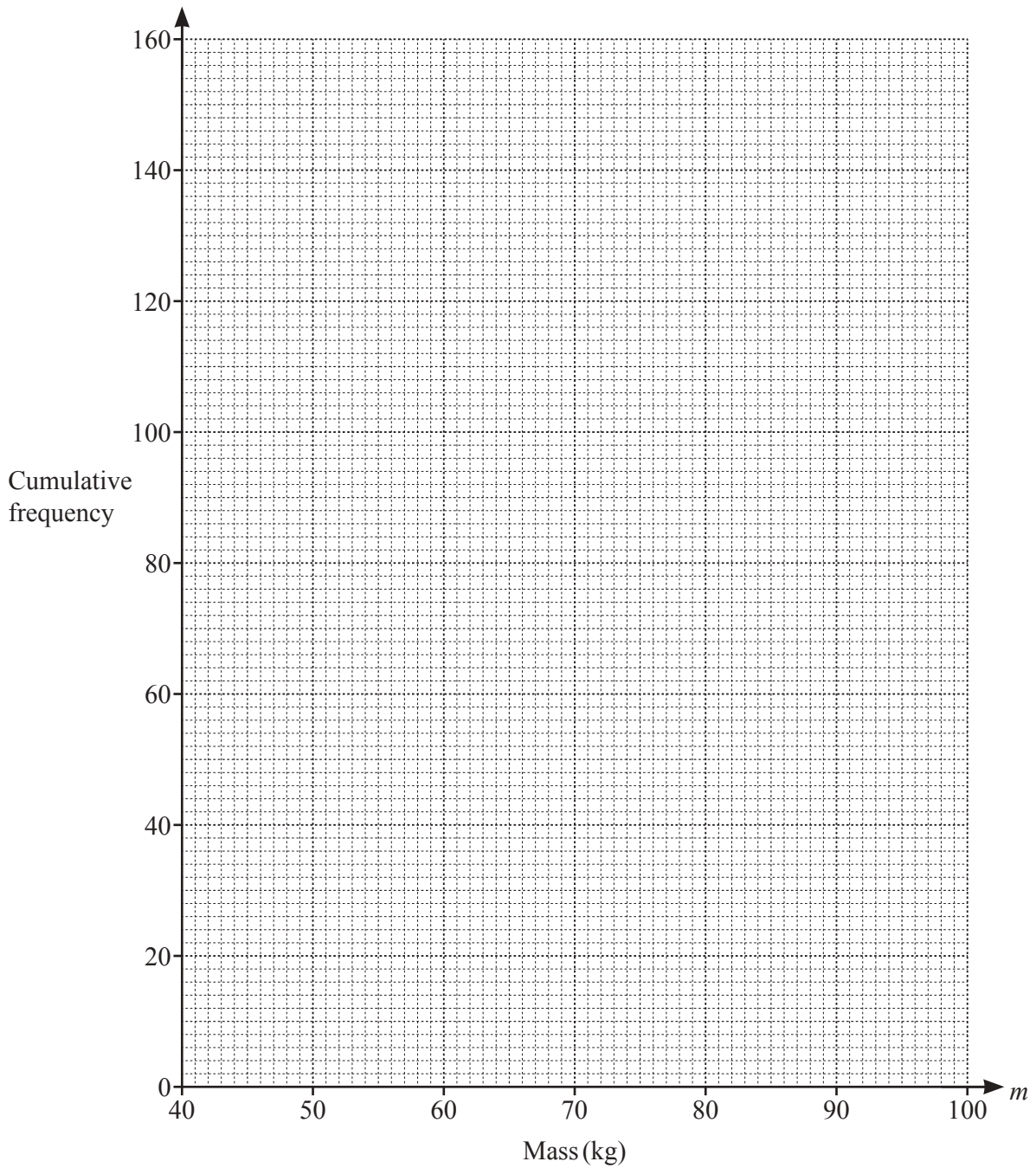
(c) Describe fully the **single** transformation that maps triangle *A* onto triangle *B*.
 [3]

(d) Describe fully the **single** transformation that maps triangle *A* onto triangle *C*.
 [3]

4 The masses, m kg, of 160 students are recorded in the table.

Mass, m kg	$40 < m \leq 50$	$50 < m \leq 60$	$60 < m \leq 70$	$70 < m \leq 80$	$80 < m \leq 90$	$90 < m \leq 100$
Frequency	6	18	66	40	18	12

(a) Draw a cumulative frequency curve for these results.



[4]

(b) Use your cumulative frequency curve to estimate

(i) the median

..... kg [1]

(ii) the interquartile range.

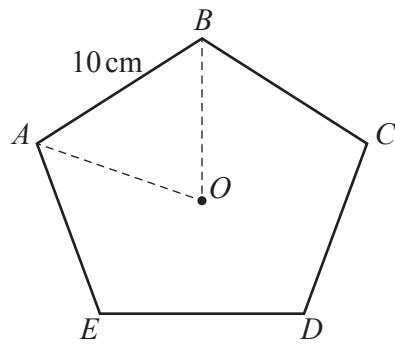
..... kg [2]

(c) The masses of 60% of the students lie in the range $p \text{ kg} < m \text{ kg} \leq 80 \text{ kg}$.

Use your cumulative frequency curve to estimate the value of p .

$p =$ [3]

- 5 (a) The diagram shows a regular pentagon with sides of 10 cm and centre O .



NOT TO
SCALE

- (i) Find angle AOB .

Angle $AOB = \dots\dots\dots$ [1]

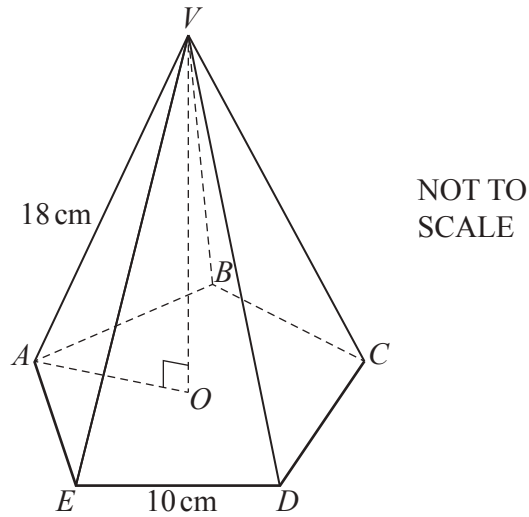
- (ii) Show that $OA = 8.51$ cm correct to 3 significant figures.

[3]

- (iii) Find the area of the pentagon.

$\dots\dots\dots \text{cm}^2$ [2]

(b)



The regular pentagon in **part (a)** is the base of a pyramid.
 The sloping edges, VA , VB , VC , VD , and VE , are each of length 18 cm.

(i) Calculate the perpendicular height, VO , of the pyramid.

$VO = \dots\dots\dots$ cm [3]

(ii) Calculate the volume of the pyramid.

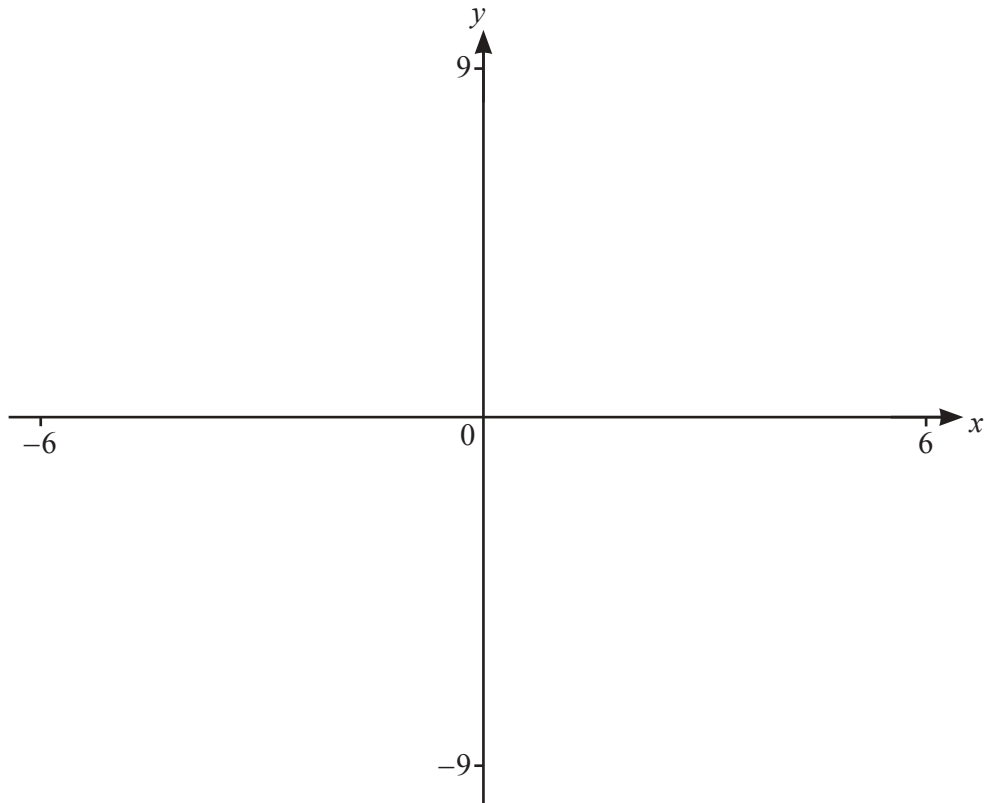
$\dots\dots\dots$ cm³ [2]

(iii) A geometrically similar pyramid has volume 1500 cm³.

Calculate the length of a side of the base of this pyramid.

$\dots\dots\dots$ cm [3]

6



$$f(x) = \frac{x^2 + 3x}{(x-2)(x+1)}$$

(a) On the diagram sketch the graph of $y = f(x)$ for values of x between -6 and 6 . [3]

(b) Write down the equations of the asymptotes parallel to the y -axis.

..... [2]

(c) Find the zeros of the graph of $y = f(x)$.

..... [2]

(d) $g(x) = x - 3$

(i) On the diagram sketch the graph of $y = g(x)$ for $-6 \leq x \leq 6$. [1]

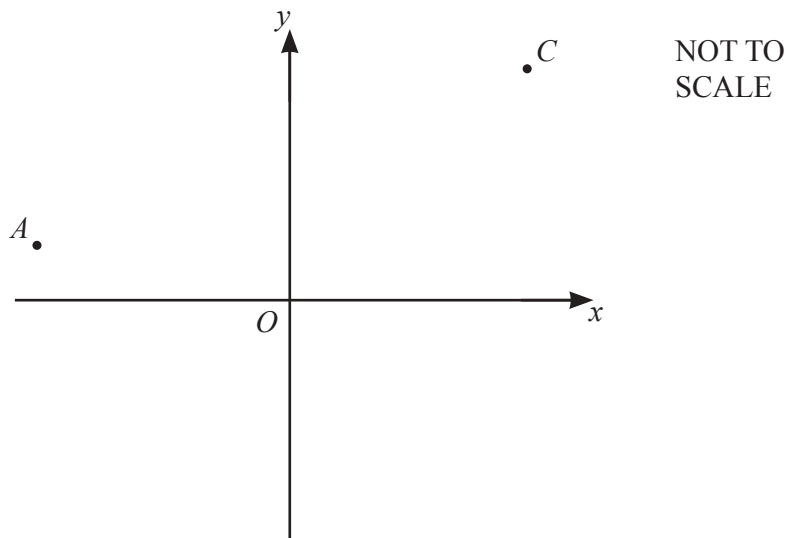
(ii) Use your graphs to solve $f(x) = g(x)$.

..... [3]

(iii) Solve $g(x) > f(x)$.

..... [3]

7 A is the point $(-8, 2)$ and C is the point $(8, 10)$.



(a) Find the equation of the line AC .

..... [3]

(b) N is the point $(4, 8)$.

Show that N lies on AC .

[1]

(c) Find the equation of the line that is perpendicular to AC and passes through N .

..... [3]

- (d) A and C are two vertices of a quadrilateral $ABCD$.
 B is the point $(2, 12)$.
 D is the reflection of B in the line AC .

(i) Find the coordinates of D .

(..... ,) [2]

(ii) Write down the name of the special quadrilateral $ABCD$.

..... [1]

(iii) Find the length AC .

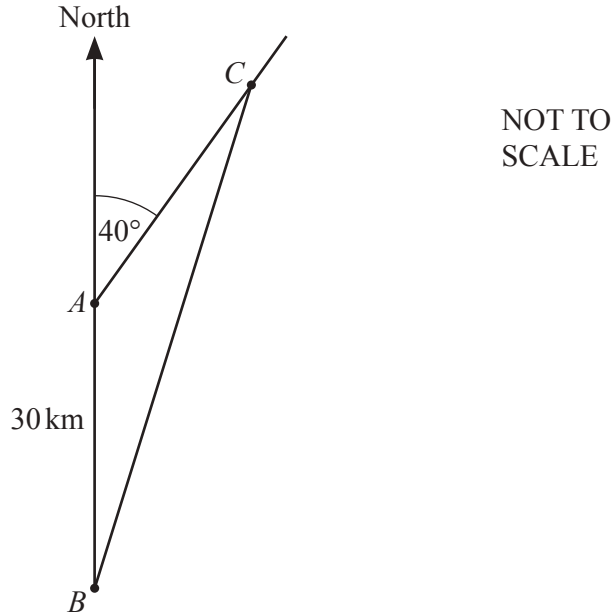
..... [2]

(iv) Find the area of the quadrilateral $ABCD$.

..... [3]

- 8 A ship sails from port A at a constant speed of 18 km/h on a bearing of 040° .
 A motorboat sails in a straight line at a constant speed from port B to intercept the ship.

Port B is 30 km due south of port A .
 The ship leaves port A at 08 20 and the motorboat leaves port B at 08 30.
 The motorboat intercepts the ship at point C at 09 50.



- (a) Find the speed of the motorboat.

..... km/h [5]

(b) Find the bearing on which the motorboat sails.

..... [3]

9



Asa and Bernice have these 10 letter cards.

A, E, I, O and U are vowels. All other letters are consonants.

- (a) Asa picks a card at random.

Write down the probability that Asa's card shows the letter **T**.

..... [1]

- (b) Asa replaces his card.
Bernice picks two cards at random without replacement.

Calculate the probability that both of Bernice's cards are vowels.

..... [2]

- (c) Bernice replaces her cards.
Asa picks 3 cards at random without replacement.

Calculate the probability that Asa's cards can be arranged to spell the word **PEN**.

..... [3]

- (d) Asa replaces his cards.
Bernice picks cards at random **with replacement** until she first gets a consonant.

The probability that she first gets a consonant on her n th pick is $\frac{48}{3125}$.

Find the value of n .

..... [3]

10 (a) Simplify.

$$3x - 5y + 4x - 6y$$

..... [2]

(b) Expand.

$$x(x+2)$$

..... [1]

(c) Factorise.

$$10ab + 8ac - 15b^2 - 12bc$$

..... [2]

(d) $\frac{2}{2x+1} - \frac{5}{x-3} = 3$

(i) Show that $6x^2 - 7x + 2 = 0$.

[4]

(ii) Solve $6x^2 - 7x + 2 = 0$.
You must show all your working.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [3]

11 $f(x) = 2x + 5$ $g(x) = 1 - 3x$

(a) Find $f(-2)$.

..... [1]

(b) Solve $f(g(x)) = 19$.

..... [3]

(c) Find $g^{-1}(x)$.

$g^{-1}(x) =$ [2]

(d) $y = \frac{g(x)}{f(x)}$

Find x in terms of y .

$x =$ [3]

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.